

## LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Markings of *Antilocapra*.

IN NATURE of Oct. 11 (p. 586) Mr. R. J. Pocock says: "If the American prong-buck were an inhabitant of Africa, I presume that its conspicuous patterns . . . would be cited as evidence supporting the theory of recognition marks. But in the prairies of the United States there are no species that resemble it in size and form, so as to create confusion as to identity."

The prong-buck is so cited by Wallace ("Darwinism," p. 218), and a figure is given (p. 219) of a similarly-marked gazelle in support of the same theory. But the point of the whole matter rests on the aid given to the members of a herd in following one another, and has nothing whatever to do with the presence of allied species. I cannot understand how Mr. Pocock, who appears to have read Wallace's work, can have overlooked the point of the argument so completely. I have had the pleasure of seeing herds of prong-bucks (*Antilocapra*) in their native wilds (Pecos Valley, and near the Sacramento Mountains, New Mexico), and can readily understand how useful the markings must be in helping the animals to keep together in the dusk or dark, whereas it is not at all probable that they expect to escape observation on the open prairie by daylight. If these animals lived singly, there might be some plausibility in "Thayer's principle," as applied to them, but in herds they can be seen from afar off, and the same must be true of the African gazelles. Their safety is in flight, not inconspicuousness, and the necessity for keeping together when in flight is obvious.

The coyote or prairie-wolf (*Canis latrans* and allies), which also lives on the prairies and is gregarious, has the habit of barking incessantly at night, and this doubtless serves the same purpose as the markings of the prong-buck.

It might conduce to clearness if we divided what are now called recognition-marks into two categories, thus:—

(1) *Recognition-marks*, which assist members of a species in distinguishing their fellows from other species.

(2) *Guide-marks*, which assist members of a species in following one another. The markings of the prong-buck would then come under the head of guide-marks. T. D. A. COCKERELL.

East Las Vegas, New Mexico, U.S.A. October 30.

## Curves without Double Points.

MR. BASSET'S objection to the term "non-singular" (see NATURE, Oct. 11, p. 572), arises from a misunderstanding. The ordinary use of the term by English-speaking mathematicians is natural and legitimate; it is applied to curves without double points when the curve in question is defined by a relation among the coordinates of its points. In the case of a curve defined in another manner, for instance by a tangential equation, "non-singular" could not possibly be used in the sense. In fact, the phrase which Mr. Basset denounces as "exceedingly infelicitous and misleading" is one which, standing by itself as Mr. Basset quotes it, strikes a geometer as unfamiliar; "non-singular cubic curve," "non-singular curve of the  $n$ th order," are familiar to him, and are unobjectionable.

In the study of algebraic curves the word *node* is in common use to denote any double point; if it is necessary to distinguish the three chief kinds of double points, the words *crunode*, *acnode*, *cuspid* are recognised; and, although the two first are not wholly satisfactory, yet their meaning is unmistakable. Further, we have adjectives *nodal*, *crunodal*, *cuspidal*, *binodal*, etc. If Mr. Basset's mode of investigation is such that the introduction of new technical terms is really unavoidable, may I suggest that the phrase *nodeless curve* concisely describes a curve without double points? HERBERT RICHMOND.

King's College, Cambridge, November 10.

## Euclid i. 32 Corr.

HAMBLIN SMITH writes, these "corollaries were first given in Simson's edition of 'Euclid'" (edition 1872, &c.). J. Walmsley, "Introduction to Geometry" (1880, &c.), styles them Simson's corollaries. Hall and Stevens say these "theorems

were added as corollaries to Prop. 32 by Robert Simson" (1888, &c.), and finally, Loney, in his edition of Todhunter's "Euclid," writes, "the corollaries were added by Simson." Many years ago it was pointed out to me that these corollaries, with many interesting applications, were given by Clavius in his edition of the Elements (1607), see pp. 105-108. On p. 107, he cites "ex Campano, si pentagoni singula latera producuntur in partem utramque, ita ut quilibet duo extra pentagonum coeant, efficiuntur quinque anguli ex lateribus coeantibus aequales duobus solum rectis." Clavius probably is not the first publisher of these results. R. TUCKER.

November 5.

## Late Appearance of a Humming-bird Moth.

IN a garden in Lower Addiscombe Road (well in the town of Croydon), I saw a humming-bird hawk-moth to-day sporting over a bed of scarlet geraniums. It was as fresh as if newly emerged. This is the first time I have seen the insect so late in the year. Would it not have been called a "late appearance" even a month ago? It testifies strongly to the unusually open autumn here. J. EDMUND CLARK.

Lile Garth, Ashburton Road, Croydon, November 3.

## SOME RECENT ADVANCES IN ZOOLOGY.

TO take stock from time to time of the progress made in its different branches is advantageous in the case of every science, but in none more so than in zoology, where specialisation is now carried to such an extent that the workers in one section have in general but little acquaintance with what their brethren are doing in another. This same subdivision of work renders it, however, extremely difficult for any single writer to give any adequate account of what has been effected during the last year or two in all the different branches of the science, the difficulty being enhanced by the circumstance that the one for 1898 is the latest volume of the "Zoological Record" that has at present been published. All that can therefore be attempted in the present article is to give a fairly full *résumé* of the more notable advances in the branches of zoology with which the writer is best acquainted, and to make mention of such discoveries in other sections of the subject as may have come under his notice.

Among the Mammalia, by far the most important discovery made of late years is the identification by Mr. J. P. Hill, of Sydney, of the existence of a rudimentary placenta in the Bandicoots (*Perameles*). From this it has been inferred that all Marsupials originally developed a placenta, which has become abortive in the more specialised members of the group. This discovery entails, almost of necessity, a modification in the generally accepted classification of the Mammalia. And instead of dividing the class into the three equivalent groups, Eutheria, Metatheria and Prototheria, Prof. H. F. Osborn has suggested that we should now take only the two divisions of Eutheria and Prototheria; the former being subdivided into Placentals and Marsupials, and the latter (as heretofore) including the Monotremes alone. Placentals and Marsupials may indeed be now regarded as divergent branches of a single stem; the latter being less primitive than are the Insectivora. On the other hand, Monotremes are so different from Eutherians that some zoologists even go so far as to consider them derived independently from Reptiles or Amphibians. In this connection, as tending to emphasise the intimate relationship between Marsupials and the primitive Carnivora, reference may be made to a paper by the present writer (*P.Z.S.*, 1899), in which it is attempted to show that both have a similar dental formula. It may be added that our knowledge of the anatomy of the Monotremes has been largely increased by the publication of the results of the work on the specimens collected by Dr. Semon, now in course of publication in the *Jenaische Zeitschrift*. Moreover, much interest

attaches to the account recently given by Herr Sixta of the precise manner in which the female Duckbill supplies her newly-hatched young with milk.

A special feature of the last year or two is the application of American modes of collection and investigation to the smaller mammals of Europe and Asia, with the result that a number of more or less well-defined local races have been established in the case of many familiar European species. Admirable examples of this style of work are afforded by Mr. Barrett Hamilton's studies of the Voles, Dormice, Squirrels, Harvest Mice, and Variable Hares of Europe and Asia. Attention may likewise be directed to the same gentleman's investigations with regard to the colour-change which takes place periodically in many northern mammals.

Till recently the Edentates of South America have been regarded as a totally isolated group; but the material obtained in the Tertiaries of North America has enabled Dr. Wortman to state confidently that they

Major's discovery that the European Lemuroid *Adapis* agrees in the structure of the tympanic with the Malagasy Lemurs (and with them alone) being of great significance. The same writer's description of additional remains of the extinct Malagasy genera *Megaladapis* and *Nesopithecus* throws further light on the specialisation of the Lemuroids, and the apparent parallelism of the latter to Anthropoids. Here brief reference must also be made, even if all his conclusions be not accepted, to Prof. Hubrecht's investigations on the placentation of the Lemuroid genus *Tarsius* and its relationship to the higher Primates.

Reverting to extinct forms, it has to be mentioned that, apart from its other points of interest, the discovery of a portion of the skin of a Ground Sloth (*Glossotherium*) in Patagonia has revealed the unexpected fact that the ossicles with which the hide of these animals has long been known to be furnished are situated on its inner instead of its outer surface; the latter carrying a thick coat of long coarse hair.

The discovery some years ago that *Wapiti* occurred in Central Asia served to call attention to the similarity between the faunas of that region and North America, and the links between the two have now been drawn closer by the description of a species of the American Jumping Mice (*Zapus*) in Siberia. Another fact of importance from a distributional point of view is the discovery of representatives of the African Hyraces (*Pliohyrax*) in the Pliocene deposits of Samos and Greece, and apparently also in the Tertiaries of South America. And these discoveries promise to give rise to much discussion as to whether Africa or North America has been the main feeder of South America in the introduction of its fauna. With this is closely connected Prof. Osborn's suggestion that Africa has formed a great creative and dispersive centre of its own.

Mammals cannot be dismissed without a brief reference to the American "Report on the Fur-Seals of the Pribiloffs," which has added very largely to our knowledge of those animals and the diseases to which they are subject; while, it may be hoped, it will serve eventually to suppress altogether pelagic sealing.

Turning to Birds, perhaps the most important work (apart from the description of species and races, to which it is impossible to allude in detail) that has been done in England is by Mr. W. P. Pycraft, who has contributed a number of valuable papers on avian osteology to the *Proceedings* of the Zoological Society, as well as communications to other serials dealing with the general morphology of various groups of the class. Of the former papers, the most important is the one on the skeleton of the Penguins, in which it is shown that these birds are less aberrant than has been often supposed, and that their nearest relatives are the Petrels on the one hand, and the Grebes and Divers on the other. But of even greater value are the same author's observations on the morphology of the Owls (*Trans. Linn. Soc.*, 1898), since they serve to indicate how many alterations will be necessary, even in avian genera, when pterylosis and internal characters are allowed their full weight in classification. The remarkable feature of "aquintocubitalism" in the bird's wing has likewise been elucidated by Mr. Pycraft in a paper published in the *Journal of the Linnean Society* for 1899; Mr. P. C. Mitchell having also written upon the same subject. The recent discovery of a new genus of Eagle (*Pithecophaga jefferyi*) by the late Mr. J. Whitehead in the Philippines is also decidedly worthy of mention. Of wider interest is the description by C. W. Andrews, in the *Transactions* of the Zoological Society, of the skeleton of the remarkable giant extinct bird from the Tertiaries of Patagonia, known as *Phororhuchus*. This extraordinary bird is noticeable on account of the disproportionately large size of its skull, more especially the beak; and



FIG. 1.—A flightless representative of the Scale-tailed Squirrels (*Zenkerella insignis*). (From Mr. De Winton's figure in the *Proceedings* of the Zoological Society for 1898.)

trace their origin from the Eocene group Ganodontia, as represented by *Calamodon* and *Psittacotherium*. The Rodents, too, have been brought into closer touch with more typical mammals by the discovery of their near relationship to the Eocene Tillodontia.

As regards systematic work, the discovery of a new Snub-nosed Monkey (*Rhinopithecus bieti*) in the upper valley of the Mekong is as interesting as it is unexpected; while of far more morphological importance is the description of a flightless representative of the African Scale-tailed Squirrels (*Anomaluridae*), for which the name *Zenkerella* must be adopted. Of even greater interest is Prof. Ray Lankester's discovery (not yet published in detail) that the Bear-like *Elurops* of Tibet has no close affinity with the Ursidae, but is a near relative of the Raccoon-like Panda (*Elurus*). Neither have the relationships of extinct forms been neglected, Dr.



when the peculiarities due to this specialisation are discounted, its affinities appear to be with the Seriema and Trumpeter of Brazil. It is, in fact, a gigantic representative of that group, occupying the same position in regard to its living allies as is held by the extinct Glyptodonts and Ground-Sloths of the same continent to the modern Armadillos, Sloths, and Anteaters.

Among works dealing with avian faunas which have appeared recently, two have a special claim for mention on this occasion; the one being Dr. A. B. Meyer's "Birds of Celebes," and the other the late Mr. A. C. Stark's "Birds of South Africa." Both of these important works have received detailed notice in these columns.

From a distributional point of view, undoubtedly the most important discovery that has been made of late years among Reptiles is the determination of remains of the Australian Tertiary Chelonian genus *Miolania* in the Patagonian deposits, which was announced last year in this journal by Dr. H. P. Moreno. It serves not only to emphasise the evidence which has been adduced from other sources as to a former land connection between Australasia and South America, but also indicates that the strata in which its remains occur must be comparatively modern. Of very high morphological value are Mr. A. Dendy's observations (*Q.J. Micr. Soc.*, 1899) on the parietal eye of the New Zealand Tuatera (*Sphenodon*), in which evidence is brought forward to show that this organ was originally double, and that the single eye that now persists in a rudimentary condition is the left one of the primitive pair. In connection with this subject attention may be here directed to the remarkable discovery, made by Mr. H. M. Bernard, that in the Amphibia the cones of the retina of the eye, instead of being separate sensor organs, are merely stages in the development of the structures known as rods. But we have still another word to say with regard to the Tuatera, Prof. G. B. Howes having been recently engaged in working out the development of the skeleton in the embryo, and having had the good fortune to hatch specimens in this country. From his own researches, and those of Mr. Dendy, it is now known that there were three pairs of incisor teeth in the young state, and also that an amniotic tube was present, and that the olfactory passages became occluded during development.

Among Fishes several discoveries and observations of first-class importance have been made during the last few years, in addition to much systematic work. The discovery of a new species of freshwater fish belonging to the genus *Galaxias* at the Cape may not appear a circumstance of much importance, but it really forms one more link between the faunas of South Africa, Australasia and South America; the genus having previously been known only from the two regions last named. Allied to this genus is the family of African Beaked Fishes (*Mormyridæ*), hitherto known only by numerous species of the typical genus *Mormyrus*, and one of the very distinct *Gymnarchus*. The careful exploration of the fauna of the Congo by the officials of the Free State has, however, led to the discovery of the existence of a very large number of distinct generic types of this very curious family, all of which have been examined and described by Mr. G. A. Boulenger. The first living examples of the Bichir (*Polypterus*) have also been recently brought to this country, and much information has been at the same time acquired with regard to its mode of life and development. Of still more importance are Mr. J. G. Kerr's observations on the external features in the development of the South American Mud-fish (*Lepidosiren paradoxa*), which were communicated to the Royal Society in the spring of 1899. The young larvæ of this fish, which are tadpole-shaped, have very large external gills, and also a cement-organ

very similar to that of embryo frogs, and Mr. Kerr was much struck with the extremely amphibian characters of the larvæ at an early stage of their existence. Among new forms special interest attaches to the discovery of a Shark (*Mitsurikina owstoni*) in Japanese waters, which indicates not only an entirely new generic type, but also, according to its describer, Dr. Jordan (*Proc. Californian Academy*, 1898), likewise a distinct family, whose nearest relationships are with the *Carchariidæ*. Equally interesting is the discovery in Chili of a new generic type of Lamprey (*Macrophthalmia chilensis*), which was announced in 1897. The importance which Dr. Gaskell, in his papers on the origin of Vertebrates, attaches to larval lampreys from a phylogenetic point of view renders the discovery of a new member of this group full of possibilities.

It is too early at present to speak of the discoveries which are likely to occur from the detailed examination of the fishes of the Nile which is now in progress, but reference must be made to those from Lake Tanganyika, described by Mr. Boulenger (*Trans. Zool. Soc.*) in 1898. Although these yielded several new generic and specific types, they were in no wise comparable to the molluscs in general interest.

These latter, as is now well known, exhibit a remarkable resemblance in the form of their shells to certain Jurassic Gastropods; a resemblance which has led Mr. J. E. S. Moore, the energetic explorer of its waters, to suggest that the lake was formerly in direct communication with the sea, and that its so-called "halolymnic" fauna is of marine origin. Some support to this theory may possibly be found in the recent discovery that a peculiar type of Jelly-fish is one of the inhabitants of the lake.

Three other discoveries among Invertebrates call for special mention; one of these being the demonstration by Dr. Pelseener that adult bi-valve molluscs may possess true cephalic eyes, and the second the dredging in Indian waters of a hermit-crab (*Chlaenopagurus andersoni*), whose caudal extremity is protected by a bag formed out of a compact colony of small sea-anemones—truly a most extraordinary example of commensalism. The third discovery is that of a new member (*Harri- mania*) of the group of Chordate Worms, or *Enteropneusta*, on the Alaskan coast, to which reference has been recently made in these columns.

So far as the interests of the human race are concerned, all other recent zoological discoveries are eclipsed by the investigations which have led to the demonstration of the relations existing between mosquitoes of the genus *Anopheles* and malaria. A definite statement that malaria is propagated by these annoying insects was made by Dr. B. Grassi (*Rend. Ac. Lincei*, vii. p. 234) in 1898, with due acknowledgment of previous suggestions on the subject; and since that date the columns of this journal have borne testimony to the zeal and care with which the work has been carried on, and the decisive results which have been obtained. In connection with this subject, brief mention must be made of the discovery of the generative elements in the intracorporeal amœba-like bodies known as *Hæmamoebidæ*, which occur in the blood of certain animals and give rise to malarial fever, as well as in the allied *Coccidiidæ*, which are parasitic in Cuttle-fish. As is shown in two papers published in the July number of the *Quart. Journ. Microscopical Science*, sexual conjunction, or "zygosis," occurs among these lowly organisms; spermatozoa being represented by "microgametes," and ova by "macrogametes."

Finally, some reference must be made to the important work on distribution which has been accomplished during the last few years. In this connection it will suffice to refer to Mr. R. F. Scharff's "History of the European Fauna"; to Mr. W. L. Sclater's papers on the "Geography of Mammals," first published in the *Geographical Journal*, and reproduced in volume form with much

additional matter; to Dr. P. Matschie's "Geographische Fragen aus der Säugethierkunde," published in 1896; to Mr. R. I. Pocock's "Geographical Distribution of the Arachnida," which appeared in *Natural Science* for 1899; to Dr. Max Weber's paper on the "Origin of the Fauna of Celebes" (*Ann. Nat. Hist.*, 1899); and, lastly, to Prof. H. F. Osborn's "Correlation between Tertiary Mammal Horizons of Europe and America" (*Ann. N. York Acad.*, 1900). In several of these papers special stress is laid on the evidences of connection between the faunas of the southern continents which have been steadily accumulating during the last few years; while, as already mentioned, Prof. Osborn's communication is notable on account of his theory as to the indigenous origin of the African fauna. In another part of the world a most important change in the limits of two geographical regions has been suggested (first by Mr. Sclater and then by Dr. Weber), by the transference of Celebes from the Australian to the Oriental region. If this change, together with a similar transference in the case of Bali and Lombok, which has been advocated (partly on the suggestion of Dr. Blanford) by the present writer, be generally adopted (and it seems inevitable), we have to bid farewell for ever to the almost classic "Wallace's Line," as being one of those hypotheses which, although useful in their day, were not destined to immortality. R. L.

#### INSTRUMENTS OF PRECISION AT THE PARIS EXHIBITION.

"AT the commencement of the nineteenth century, the French and English makers of scientific instruments were far in advance of the Germans. True, the eighteenth century knew of prominent mechanicians . . . yet the French and English makers took the lead so as almost to supply the world's entire demand in scientific instruments. This predominance had the further consequence of causing young Germans to emigrate to France or England in order to thoroughly master their subject. Many a German mechanic of to-day owes to French or English masters a substantial portion of his knowledge. The prominence of the French and English instrument makers was mainly due to the support which, in both countries, the State bestowed upon technical art." . . . "In Germany it is only within the last twenty or twenty-five years that the State has espoused the interests of the home industry in scientific instruments; but such have been the efforts and the results, that her position has, at a blow as it were, changed in favour of Germany."

These words are taken from the special catalogue of the joint exhibition of German mechanicians and opticians at the Paris Exhibition, which claims, and claims with truth, "that in this department Germany occupies now a foremost position." As to the excellence of this joint exhibition, it is difficult to speak too strongly; rumour says that some, at least, of the judges wished to award it a Grand Prix among the nations. Had the rules of the Exhibition allowed it, such an award would have met with the universal approval of all physicists who have visited Paris.

Another brief quotation from the preface will explain the position more clearly. "After witnessing," the writers say, "the steady development of our mechanical and optical trade, we cannot but look with gratification upon the practical demonstration, at the Paris Centenary Exhibition, of the flourishing state of the scientific instrument trade in Germany; and a characteristic feature of the latter is the unity of its aims, which is traceable to the history of its development and to its ultimate connection with pure science. It appeared, therefore, desirable to depart from the usual custom of grouping the

exhibits under various firms, and to place them in sections embracing certain classes of instruments, so as to demonstrate on broad lines and, as a whole, within a well-arranged though condensed area, the present position of German mechanical and optical art."

Accordingly this was done under the auspices of the German Association of Mechanicians and Opticians, and, with the help of the authorities of the Reichsanstalt and of the Standardising Commission, a most remarkable exhibit has been arranged; a catalogue has been prepared, covering some 250 small quarto pages, well illustrated, with a full account of the various instruments and references to sources of further information. This is published in German, French and English—why the English edition is printed in German type is perhaps somewhat of a mystery—and issued freely to visitors who wish to use it.

The preface to this catalogue, from which the above extracts are taken, gives an interesting account of the growth of this industry, from which it appears that in the last ten years the annual value of the instruments exported, including the optical glass used for lenses, has risen from something over 200,000*l.* to over 700,000*l.*

The general exhibition is arranged in ten sections, with various subsections; the special exhibit of the Reichsanstalt forms an eleventh section to itself. In each of these sections or subsections the exhibits of each maker form a class to themselves.

Thus Section V., optical instruments, has seven subdivisions. The exhibit of Carl Zeiss, for example, appears in five of these, as well as in Section II., astronomical instruments. By means of the table of contents and list of exhibitors, it is easy for a visitor to find either the apparatus of a special class or the exhibit of a particular firm as he will.

Section I. contains metrological and standardising apparatus, and here the exhibit of the Normal Aichungs Commission is most striking. The Commission is presided over by a director, and includes, we are told, three Government councillors, twenty-four technical officials, and ten clerks; the annual expenditure is 8500*l.* Contrast this with the staff of our Standards Department, and its expenditure, according to Whitaker, of 2877*l.* Specially noteworthy, perhaps, among the exhibits of the Aichungs Commission are the model of their great comparator, and the vacuum balance made by Stückrath for comparing masses from 200 grammes to one kilogramme. But a detailed description of the catalogue would take too much space, and would indeed be of no great value to a reader; the book itself will prove to a physicist a well of useful information; the exhibit, however, must be seen in its entirety if we wish to realise what our German cousins have done.

Not that the sight is one which brings great pleasure to an Englishman, and if he moves on to examine the English exhibit his thoughts cannot fail to be very grave. There is nothing which can be compared with the German show; some well-known firms have won well-deserved prizes; there are some few interesting pieces of apparatus from South Kensington, and here and there in the electrical department one comes across a case of instruments. For the rest, the visitor will find, not collections of scientific apparatus, but small portions—attractive portions, it is true, in many cases—of the windows of well-known opticians' shops. As much apparatus as is possible is packed together in a small space, there is much repetition, there is no organisation, there is no attempt to instruct the learner or to attract the man who comes with inquiries with a view to purchase; English mechanics and opticians have no unity of aim, and their art, with some few exceptions, is but loosely linked to pure science.

A visitor who visits Paris to look for the most recent forms of scientific apparatus must have the conviction